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AMERICAN DYESTUFF REPORTER

A Weekly Publication devoted to

DYESTUFFS, COLORS and ALLIED CHEMICALS

"Circulated Everywhere Dyestuffs are Used"

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Quality Paramount if The American Dyestuff Industry Succeeds

NO matter how much progress is made in any direction we will always meet persons, who seem to be related to the pacifists, who will sneer and point out the small defects and tell of other wonderful achievements by our friends, the enemy.

The department store clerk has been silenced and he no longer chirps to each customer about the inferior American colors. The newspapers and trade journals have commenced saying nice things about our dyes and just as we begin to feel satisfied we hear a low growl from the dyehouse. If a dye is not right it is quite right for the dyer to say so, but will he not be fair enough to let the complaint stop there, and not add to his remark: "It takes the Germans to make good dyes?"

We have stated before, and it will bear repetition, that dyes made in this country are every bit as good as the same dyes made abroad. That is, it is quite possible to make them here and many factories are doing so, but there are unfortunately some instances that give good ground for the criticisms.

If a dyestuff factory is operated in the proper manner, with the best appliances that can be obtained and a force of technical and research chemists all under good business management, the result is a line of goods that are a credit to the establishment and to the country. When, however, men who have nothing but money obtain the services of a near-chemist and put together an imitation factory in which every principle of good management and common sense is disregarded, it is not surprising that the output will be the cause not only of complaints, but tend to throw discredit on the industry at large.

Everyone is familiar with the superiority of Swiss watches, just as we also know the famous Connecticut alarm clock. They both indicate the time of day and the alarm clock even does more, but who would attempt to put them in comparison? The difference in quality is not so much in materials as it is in the character of workmanship. One requires care and tedious workmanship and the output is small, the other requires only slight skill and the output is enormous. The same conditions apply to dyestuff manufacture and the great demand for quantity makes it a temptation to sacrifice the finer qualities; but in this case it does not mean that the quality cannot be obtained in most cases when the market conditions permit. There always will be factories turning out alarm clocks, despite the demand for Swiss watches, and there will be dye factories that will never rise above their present grade of goods; simply because they are incapable of it.

Let us consider Fuchsine crystals for

example. The factory gets as far as a strong solution of Rosaniline Hydrochloride and commences crystallization. After several weeks in the tanks the crop of good crystals is removed and under favorable conditions the yield may be 40% (a high estimate) while the remaining liquor and the residue must be depended on for the balance of the product. The later crops of crystals either require too much time to form or are so contaminated with residue that the process does not pay. As an alternative the whole liquor is evaporated and the mass broken up instead of being crystallized. The product contains insoluble residue, is dull and difficult to dissolve. This does not mean that Americans cannot make good Fuchsine crystals, it only means that market conditions at present will not permit of the proper care, time and expense. But bit by bit the inferior grades will be automatically eliminated by the general law of "the survival of the fittest," and in time it will be profitable and obligatory to furnish only first-grade crystals. They could be furnished today if the consumer would pay the extra expense, but as long as some factories are offering the lower grades at certain prices and the consumer uses them, there is little encouragement to produce the better product at higher cost.

This same condition prevails through a large series of dyes. Ayo dyes are generally free from defects of a serious nature, but all the triphenylmethane derivatives offer many possibilities of trouble, and unless the consumer is willing to pay for the extra work involved, there will be no improvement in quality as long as the demand is for quantity.

We could give many concrete examples of dyes that are not perfect, but that does not indicate that they represent the best that can be done at present. The dyestuff manufacturer does not control prices of raw materials, machinery or the cost of labor, skilled and otherwise and is not to be criticised if he cannot meet an arbitrary price. If he is forced by the market to meet any certain price that alone limits the amount of refinement that can be put into the product. The dyer or consumer must learn to appreciate these facts and then let him complain if he will—that is a matter between him and the manufacturer, but he has no right to say that "it takes Germans to make good dyes," that hurts the country at large.

Every just complaint by the user will improve the quality of the product and perhaps raise the general price a little as the inferior grades are eliminated from the market. Some of the factories are bound to go to the scrap heap as time goes on, but those that survive will improve as long as they are given a chance.

The development of this industry, like many others, is very much in the hands of the consumer, and if they do not assist it they will suffer accordingly.

Dyestuff Association Meeting Called for March 6th at the Chemists' Club

THE first meeting of the Dyestuff Association of America, as it will probably be called, will be held at the Chemists' Club, 52 East 41st Street, New York City, on March 6th, at 10 A. M. The interest that was awakened by the Convention which met on January 22nd and 23rd last was of such a widespread character and embraced such a large percentage of the aniline dye manufacturing and distributing houses, it is expected that this forthcoming meeting, at which the final organization will be completed, will be of an equally representative character.

During the interim between the Convention and this first organization meeting, the Committee on Organization has been busy discussing various questions which will be submitted to the consideration and decision of the Association, and the Sub-Committee on the Tariff will by that time have had its conference with the United States Tariff Commission in Washington, and will be prepared to report as to what encouragement will be given by the Government in the direction of a proper protection of the new industry.

The By-Laws have been drafted and will be put before the meeting for ratification or amendment, and a recom-

mendation as to the permanent officers of the Association will be made for the consideration of the representatives present.

This will be the time when the new dyestuff association will pass from the embryonic to the actual stage, and the work done at this first organization meeting will indicate the spirit and policy with which the organization will be conducted hereafter.

It is hoped that every manufacturer of dyestuffs and intermediates in the country and all the legitimate dealers and distributors of dyestuffs will be present at this meeting to take part in the decisions which will so vitally affect their interests, for in so far as this is done the permanence of the industry will be assured.

A New Vegetable Dye From India

Interesting developments in the vegetable dyestuff field are reported by the Department of Experimental Research in India. A discovery of particular note is that of sappan wood. It has been found possible to prepare the dyestuff in a commercial form soluble in water similar to an aniline color. Dyeing experiments have been made with the dyestuff on silk and a large number of inquiries are said to have been received for this dye.

Proposals are under consideration for its manufacture on a large scale by an outside agency working independent of the Government.

A New Fur Dye

A discovery of a new fur dye which will be called St. Louis dye is announced by Col. Philip Fouke, President of Funsten Bros. Fur Co. Members of the company declare this new dye to be the best fur-coloring matter ever known. Until this company had located their dyeing plant in this city almost all of their work was done in France and England.

A member of the company has declared that the plant now in operation in this country turns out about 300 skins a week, and it is expected that the output will be increased from 1,000 to 1,200 skins per week.

A Tribute to American Made Dyes

At the recent meeting of the Drysalters' Club, Mr. Hobbs, President of the Arlington Mills voiced the following opinion regarding American dyes:

"So far as I know, out of the millions of yards of cloth that have been delivered since the American dyestuffs have been used, not a yard has been returned on account of any defect in dyestuff.

"A year has gone by and I still feel as I have always felt that not only the American dyestuff industry should be developed by all reasonable means, but all American industries should be developed to the greatest extent.

"I believe in America first, last and all the time whether in peace or in war."

If the other consumers of dyestuffs in this country are of the same opinion as Mr. Hobbs, then surely the industry can expect the hearty cooperation that is necessary to the industry's permanency.

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Tests of Sulphur Dyestuffs

THERE is probably no class of dyes which cause so many difficulties in testing as the sulphur dyes. There are several reasons for the varying results and an understanding of the conditions is of great importance. A commercial sulphur dye, whether it be a black or a color is a substance in powder or paste, insoluble in water and requiring sodium sulphide to put it into solution. Every product of different manufacture has a certain proportion of sulphide which is most favorable and this varies also during the dyeing, according to the concentration of the bath and the amount of exposure to the air during the process. Commercial sodium sulphide, particularly the concentrated brands, is not true monosulphide but a mixture of polysulphides and requires the addition of caustic soda to prevent separation of sulphur. Then the amount of salt added to the bath varies with each distinct product. What is favorable to one is an excess or deficiency for another.

Therefore to test two sulphur dyes comparatively it would be necessary to know first the most favorable conditions of the dyebath. This can only be determined by numerous experiments which consume more time than is generally allowable. Another condition which exists is that a fresh sample requires less sulphide than one which has been kept longer. Old samples of sulphur blacks even show an actual loss of coloring power under the most favorable conditions and the same is very likely true of fancy colors.

So far no standard method of testing sulphur dyes has been adopted although the need is great. It is hoped that some practical suggestions will soon be forthcoming as it is important that we be enabled to keep a check on this class of colors as well as we are now able to do with the acid, basic, direct and mordant dyes.

Stabilizing Dyestuff Industry

Ways to Produce Most Essentials in American Plants—Capital Estimated at $200,000,000.

IN making any statement regarding recent developments in the American dyestuff industry, it seems in order to first mention what has been accomplished in 1917 in this field by our American manufacturers, says Mr. Charles H. Stone, of the National Aniline and Chemical Company, Inc., of New York.

The first of 1917 found the dyestuff producers of this country making a sufficient quantity of coal tar colors to meet the pressing requirements of our American dyestuff users, whatever their needs; the textile mills, however, still felt more or less dependent on the meagre quantities of the better grade imported colors for their guaranteed fabrics.

The first of 1918 finds a greatly changed situation. For comparison, a year ago there were very few of the better class direct dyeing cotton colors made in this country; to-day there are a number of these regularly available; then there was not a diazotizable cotton color to be had; to-day the number of shades which can be produced with available colors of this very valuable class is about a dozen; then the only sulphur color being made in commercial quantities was black; to-day all the shades of this series of very fast colors generally used before the war are being produced on such a scale as to meet the necessary requirements of the trade.

The year's developments in colors for wool dyeing have not been as noteworthy as in colors for cotton and silk dyeing, the evident reason being that at the beginning of the year 1917 this field was more fully occupied by colors of satisfactory fastness properties than in the field of cotton colors.

In this branch of the industry there have been notable additions, however, of very fast to light colors for dyeing dress goods, carpet yarns, etc., in a great variety of shades; a number of brilliant permanent chrome-developed colors used in dyeing the highest grade

of fabrics for men's and women's wear, and also a very complete series of colors for dyeing such specialties as unions, silk effect piece goods, etc., have also become regularly available.

KHAKI DOMINATES THE FIELD

The thoughts of your readers naturally turn to khaki when colors are mentioned; and they will be interested to know that about 40 per cent. of all of the woolen looms and 25 per cent. of all of the cotton looms in America are now weaving cloth for our Government, and practically all of the colors used for dyeing the production of these looms, whether cotton or wool, are made in America from American materials in factories owned and operated by Americans.

And just here a word of information for those who criticized the mottled effects sometimes apparent in the khaki uniforms of our splendid boys on parade last summer and fall: Some of the uniforms then worn were dyed with imported dyes of demonstrated inferiority, but now that all the uniforms in use have been dyed with all-American made dyes this cause of criticism has been overcome, and the colors of the uniforms being delivered to our soldiers to-day will demonstrate better than any other single fact the progress made in the American dyestuff industry during 1917.

Before passing from the year's achievements in the development of this industry, it should be stated that the needs of the silk, leather, paper, ink and other color-using manufacturers have not been neglected, and the same relative advances have been made in meeting their exacting requirements as in the other fields.

THE PROGRESS OF 1918

What progress will 1918 bring?

What I have said above applies to the business in America as a whole. In speaking of the developments of this year, I have naturally to confine myself to the organization of which I am a member. Conditioned upon our Government permitting us to use the necessary intermediates now or soon to be available, our company will make far greater progress this year than last in placing at the disposal of the American color users not only all the necessary colors they require, but many of the specialties they have been accustomed to use, thus removing the last excuse existing for the importation of any coal tar dyes into America. Putting this statement differently, in 1917 the American dyestuff manufacturers made as great progress as had the foreign manufacturers in any ten years; and barring governmental interference, our record for 1918 will better that of last year.

The field for American-made dyes seems practically unlimited. At least one of the companies has taken a commanding commercial position; its financial position is strong; its directorate is representative, and its selling policy is aggressive with numerous American branches, and a number of foreign connections, supplemented by its own traveling representatives now active in a number of the important foreign textile centers.

DYE CAPITAL ATTAINS $200,000,000

With a very large percentage of the known coal tar colors now being made in America, and these comprising practically all of the necessary colors; with an investment of $200,000,000 for producing colors and their intermediates; with the industry having entered the realm of big business, with big men at its helm; with the propagandist's paid-for signs of "Colors not guaranteed," so prominently displayed on every hand, discredited by the manufacturers' own guarantees of fastness, there remain but two questions before the American dyestuff manufacturers to-day — Can our Government let us have the necessary intermediates during the war? and will our Government give us the necessary tariff protection after the war?

Textile Show Coming

THE Textile Show to be held in the Grand Central Palace, New York City, April 29 to May 11, despite war conditions, promises to be the greatest exhibit of its kind that has ever been held. Although the exposition is three months away it is growing by leaps and bounds and the whole textile trade

seems to be awake to the possibilities offered.

It will be an international affair. The committee is now arranging to send out invitations in French, Spanish, Portuguese and English to Europe and to South America. These "bids" will be sent to the leaders of the industry and even though at this time the Dove of Peace has not shown any great strength, yet there is a feeling in the textile world that the big textile men in France and Belgium, who have had their mills either demolished or taken down and transported to Germany, will come to the Textile Show at the Grand Central Palace and order their material for the reconstruction of their mills. Spain, Portugal and South America are now looking towards this market and the big show will be an added impetus for these buyers to come to New York.

The Textile Exhibitors' Association are going to handle this international aspect in a big way. They have the co-operation of the New York Board of Trade and the Importers' Association and have every promise that there will be a great crowd of foreigners on hand. A staff of interpreters with a clerical and stenographic force will be established so that American manufacturers will have no trouble doing business with the non-English speaking buyers.

A committee of the Textile Exhibitors' Association are now at work on another department which has been designated as Department "D" of the Textile Show. This will be largely taken over by the silk, woolen, cotton and knit manufacturers of finished goods. There will be a Fashion Show with living models.

It is expected that these finished product manufacturers will come in in groups and that it now appears the entire industry will be represented.

General Manager Chester I. Campbell is quite enthusiastic over the prospects of it being the greatest show ever. He states that the textile machinery and mill supply folk are going to show a much more varied and comprehensive exhibit than was shown in Boston, which was a record-breaking show.

As a great many of the Textile Associations are meeting in New York City during the two weeks of the Show, the whole affair is taking on an atmosphere which even at this time marks the gathering of textile men of unusual importance.

Notes of the Trade

The American Synthetic Colors Company of Stanford, Conn., is planning for the construction of a large addition to its plant to provide for increased capacity. The structure is estimated to cost $30,000.

Organization papers have been filed by the Mayland Manufacturing Company, of Bloomfield, notifying of intent to operate a chemical manufacturing works at 71 Willet Street. Anthony J. Mayland heads the company.

For the purpose of increasing its capacity, and for the completion of a large Government order, the Calco Chemical Company, Bound Brook

We manufacture

Khaki Colors for Wool

Dye Products & Chemical Co., Inc.

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Newark, N. J.

200 Fifth Avenue
New York City

Road, Bound Brook, manufacturer of chemicals, has commenced the construction of a large new addition to its plant. Frank N. Goble, 1 East Forty-second Street, New York, has the contract for erection.

The Butterworth-Judson Corporation, Avenue R, Newark, N. J., manufacturer of chemicals, has taken out a building permit for the construction of a new two-story addition to its plant, about 60x105 ft. The structure will cost $12,000.

A new one-story brick condenser house addition, about 40x60 ft., will be erected at the chemical manufacturing plant of the Maas & Waldstein Company, Avenue R., Newark, N. J. The company has taken out a building permit for the structure.

The Nitro Chemical Corporation, 20 Broad Street, New York, has recently acquired a portion of the local plant of the Canadian Car & Foundry Company, and is planning to commence immediate construction of about twenty-five new buildings, 60x400 ft., to be devoted to the manufacture of picric acid for the Government. When running to capacity, it is expected that the plant will have an output of approximately 800,000 pounds monthly of wet picric acid, which is used in the manufacture of hand grenades. About 4,000 hands will be employed. Contract for the construction of the new plant has been awarded to W. J. Burke, Lyndhurst.

Fire, on Jan. 12, destroyed a portion of the plant of the Roessler & Hasslacher Chemical Company, Perth Amboy, N. J., with loss estimated at about $25,000. The company has recently conveyed to the General Bakelite Company, manufacturer of insulation specialties, a subsidiary organization, property at Fayette and Rector Streets. It is said that the site will be used for extensions to the latter company's plant.

The Globe Rubber Tire Company, Trenton, N. J., is planning for the construction of additions and improvements at its plant to provide for increased capacity.

The Farmingdale Chemical Company, manufacturer of chemicals and allied products, has acquired the plant of the E. C. Nelson Manufacturing Company, Farmingdale, for a consideration of about $75,000, and is planning to operate the works for the manufacture of chemicals which were obtained from Germany before the war.

Government Demands Large Quantities of Dry Colors

The principal feature of interest in this week's trading of dry colors has been the large quantities that have been demanded by the Government. The shades for which the Government is in need are chrome greens and yellows and Prussian blues.

MALE HELP WANTED

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MYRON DREW REESER, Managing Editor

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The Tariff Question

HERE is a broad contention made by a prominent educator with which we heartily agree. It in a way answers the various and sundry arguments, inspired or otherwise, relative to the advisability and value of a representative organization among dyestuff manufacturers, or in fact any and all highly specialized industries.

Professor Jackson of the Chemical Engineering Department of Columbia University has this to say with regard to what may be called the war of chemists: "The enormous tonnage of explosives required," Prof. Jackson explained, "must be produced by the chemist. The chemist must also produce materials for bombing and gassings, and must furnish fuels for ambulances, autos and aeroplanes. The khaki color which makes the soldier's clothing inconspicuous is also the product of his handiwork.

"With proper legislation we can manufacture, on a competitive basis, practically every chemical product which we now import. Cheap labor is not a factor of importance. The final selling price of strictly chemical products imported into the United States annually before the war has been estimated at $250,000,000, of which not over 4 per cent. represents labor value.

"The Germans have for many years realized the necessity of furthering the work of the chemist and the chemical engineer for warfare," continued Prof. Jackson, "as well as for the necessities of industry in time of peace. They knew that by developing their enormous color establishments in peace time, they were producing factories which could be readily changed to explosive works in time of war.

"The fact that strong corporations are entering chemical manufacturing fields, indicates that capital feels a reasonable assurance that this country will further and sufficiently protect their interests after the war, in order that we may independently produce our own necessities and at the same time add new assets to the Nation's wealth."

Certainly we must all agree that this country must sufficiently protect such interests after the war and immediately the tariff bugbear shows its head. The most recent number of the tariff information series of the United States Tariff Commission is a pamphlet on "The Dyestuff Situation in the Textile Industries 1913 and 1916." In it are presented the results of an inquiry sent to 77 companies who are representative consumers of dyestuffs in the textile industries of the companies reporting, 23 were engaged in cotton manufacture, 25 in wool manufacture, 8 in silk manufacture, and 21 were independent dyers and finishers. The cotton manufacturers were the only group reporting the use of a smaller quantity of dyestuffs in 1916 than in 1913. A substantial increase as reported by the other groups would seem to indicate that by 1916 the domestic manufacturers of dyestuffs had made considerable progress in replacing foreign-made dyes with those of American manufacturers.

The increase in the costs of the individual dyestuffs is particularly striking. In some instances alizarin and anthracene colors were purchased in 1916 at prices 20 to 30 times those paid in 1913. The total value of all the dyestuffs consumed by the 77 companies in 1916 was approximately four times the value of the dyestuffs consumed in 1913. The greatest shortage occurred among the dyes which were not made in this country before the war, particularly in the case of synthetic indigo and the vat dyes from anthraquinone needed by the cotton dyer and the alizar in colors needed by the wool manufacturers. Vegetable indigo and natural dyes such as logwood and fustic came into importance as substitutes for the coal-tar

derivatives. American-made sulphur colors were given a wide application and certain gallocyanine dyes were developed to replace the imported alizarin and anthracene blue.

The opinion of the textile manufacturers as to the operation of the present dyestuff schedule of the tariff and their suggestions for changes to meet the conditions after the war,form what is perhaps the most interesting part of the report. These opinions, which are quoted without the indorsement, criticism, or comment of the Tariff Commission, indicate that on the whole the textile consumers of dyestuffs will give the new American industry the support and patronage that will insure its continuance after the war.

A Query Answered

Editor of DYESTUFF REPORTER:

Will you kindly ask your chemist how the following defect may be obviated. In dyeing woolen tops black in the Franklin Dyeing Machine we have dissolved Chrome Black in half a barrel boiling water, boiling it well to dissolve, this is then emptied into the tank of the machine, but after the operation of dyeing is concluded we find a gummy deposit all over the top layer of tops and also in the bottom of the Machine. The entire formula used is as follows:

6% Chrome Black
⅛% Mordant Yellow
5% Acetic Acid
Add 2% Acetic Acid, boil 20 minutes.
Add 2% Bisulphate Soda, boil 20 minutes, then run liquor off and wash; finish with 2½% Bichromate Soda, 2½% Lactic Acid; boil 40 minutes.

After-chrome blacks are particularly likely to cause much froth and to deposit a dark scum around the top of even an open kettle. The scum which would form on a yarn kettle would be caught, as in a filter, by the closely-packed wool and show on the outside. The use of 10% of Glauber salt with the dye is advisable. We would omit all acid until the liquor had boiled and circulated well through the wool and then feed it gradually. When the acid is added at first there is a tendency to accumulate on the outside of the tops, leaving the inside pale.

When the dyebath is exhausted use

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only enough chrome to develop the shade. The average chrome black only requires 3/4%. The use of lactic acid only diminishes the action of the chrome and we would suggest its omission entirely. The chroming should take place in one-half hour, providing the circulation in the machine is perfect. Aim to use as little chrome as will develop the shade evenly, because an excess will cause a reddish tone. It is also possible to chrome tops in a machine by adding the chrome direct to the exhausted dye liquor and omitting the washing until later. Often it is necessary to feed the chrome while running to avoid overchroming the surface and having the inside undeveloped. Such a condition will give a reddish black after gilling which is not fast to washing while an even chroming gives a full black shade fast to all requirements. If these suggestions do not correct the trouble you should call the attention of the manufacturer of the dye to the case or try the product of another factory.

Chrome or Mordant Dyes

The supply of chrome or mordant dyes is fairly satisfactory. There are many made in this country and some imported from France, Switzerland and England. The true alizarines are rare and most of the dyes sold under that name are azo dyes. This is no detriment as many of the chrome colors are even superior to the true alizarines in some respects, especially in their dyeing qualities, such as leveling and penetration. Many are capable of being dyed in three ways, viz., chrome mordant, after-chromed and chromate or metachrome processes. After-chroming has never been as popular as the other processes because it is not so easy to match shades on account of the changes that take place after the chrome is applied. After-chrome colors are probably the best for yarns because the long boiling necessary to the other two methods is likely to cause felting and tangling.

The metachrome process, patented by the Berlin Aniline Works, and the chromate process, Cassella, add bi-chromates with the dye and by the gradual increase in temperature and addition of acid, either directly or by decomposition of ammonium salts, the wool becomes mordanted first and the dye then unites with it on the fiber. Only such dyes as will not precipitate in the cool bath will dye in this way. The processes were considered as great achievements and became very popular, but it is a well-known fact that over twenty years ago the essential features were to be found in a line of "one-dip alizarines" put out in paste form in Boston. The greatest drawback of one-bath chrome dyeings on pieces is that the free chromic acid is seldom reduced entirely or has exerted its full effect at the time the goods are removed from the bath, and when the piece is steamed, a further action takes place at the inside of the roll and a shading, or cloudy effects result.

The remedy is to finish with a little formic acid in the bath and insure the reduction of the chromic acid to a green chromium compound. If the dye will stand it a small quantity of sodium bisulphite would be more effective and

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much less expensive. Many of the one-bath chrome dyes as well as the after-chrome colors will leave silk effects white, and practically all will leave cotton and artificial silk unstained. Both classes of dyes should be tested out separately and their working qualities studied as some, particularly the blues of the Chromatrope series, may require a much larger amount of chrome than usual to develop the final shade, and if the color is not fully developed the fastness will suffer and further changes in shade may be expected during steaming or even during pressing by the tailor.

Dyeings on Chrome Mordant

Dyeings on a chrome mordant need a few words of comment. If we are using a true alizarine in insoluble condition, or one made soluble by combination with bisulphites or other classes of dyes such as gallocyanine, which are often bisulphite compounds, we may only use a chrome mordant which has no oxidizing power. The non-oxidizing mordant is always greenish-blue in color and never has a trace of yellow. A yellowish chrome mordant contains some chromic acid and will cause a loss of coloring matter by oxidizing it in the bath. The precipitated color lake which is formed may remain in a fine colloidal condition and affix itself loosely to the fiber, giving later the appearance of a perfectly exhausted dyebath, but the goods will lose color in washing and generally crock.

One does not need to be so particular in using the ordinary dyes on a chrome mordant because most of them have the one-bath dyeing quality and will affix themselves to the wool rather than precipitate in the bath. To make the non-oxidizing mordant a strong reducing agent it is necessary to use with the bichromate. There is a scarcity of these at present and while formic, oxalic and tartaric acids could formerly be used, we can still obtain lactic acid. As a large amount must be used to obtain complete reduction in a reasonable length of time, the expense is likely to be too great. We can, however, adapt the Amend process with a considerable saving in time and cost. The original process, patented over twenty years ago, worked the wool first in chromic acid (sold in crystal form), then in a cool bath of sodium bisulphite, which gave a complete reduction. We may charge the bath with 2 to 3 per cent of bichromate of soda and an equal amount of sulphuric acid, but as the acid causes the mordant to take on rapidly it is well to arrange to add the acid slowly after the wool is well wetted out.

Boiling causes a slight reduction at the expense of the wool itself but this also tends to cause a better penetration into the fiber substance. After twenty minutes or a half hour boiling the steam may be shut off and about 2 per cent of the commercial solution of sodium bisulphite slowly added so every part of the wool may be equally acted upon. The first change that takes place is the formation of chromium chromate, a yellowish brown color that compares with the reduction caused by tartar. Then in a quarter hour's time add slowly enough bisulphite to complete the reduction and give the desired greenish-blue color. The exact quantity cannot be calculated as it varies with conditions, but an ex-

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Microscopic examinations Photomicrographs

cess does no harm and is removed in the rinsing that follows. Such a mordant is fast on the fiber and has no power to precipitate the color anywhere but on the wool. It is less costly than the regular methods and leaves the wool in softer condition. Another peculiarity that is remarkable is that cotton specks and threads also take on some of the mordant and some of the color during dyeing, and while never of a full shade do not show conspicuously.

A chrome mordant less reduced may also be made in this manner by the use of less bisulphite. As the stripping and fixing of colors on shoddy and rags is generally done by chrome and sulphuric acid, a final treatment with bisulphite will convert it into a satisfactory mordant for fast colors as well as for dyewood extracts.

Fading by Ultra Violet Rays

The light or exposure test is necessarily a very variable and uncertain test at the best and we are glad to see that now there is a stronger movement in favor of the ultra violet exposure, some of the Government departments, at least, having recognized its value and saving of time. The opposition to ultra violet rays as a substitute for sun and weather are prepared to show that many dyes vary in their fading by both methods and that no exact ratio is possible for all colors. These facts cannot be disputed, but the same reasoning applied to sun and weather would lead to still worse confusion. The sun gives out with its light and heat a certain assortment of short rays in the ultra violet region of the spectrum, which do not pass through glass, cannot be reflected nor refracted, and which act on moist air, producing ozone, oxides of nitrogen and hydrogen peroxide. The intensity of the sunlight and the relative humidity, varying from day to day, make an exposure test a very irregular matter. We can never tell whether the loss of color, which we call fading, is due so much to molecular disruption from the short rays of the sunlight as to a real bleaching action or oxidation. A comparison of a dry sample under glass would also give uncertain results as most of the active rays are kept out by the glass.

Ultra violet rays, produced by an effective apparatus, on the other hand, give an assortment of short rays that may differ from the sun's assortment just as the light from a mercury vapor lamp differs from gaslight. The quality of the rays do not differ, but there is a somewhat different proportion. Work is under way at present toward the charting of the short invisible rays, which cover quite a distance beyond the last visible violet, but until we get more information the work of testing fastness to light will be somewhat empiric.

The fact remains that the short rays do fade dyes, that the source of light, moisture and time can be exactly controlled and, having once exposed a standard, subsequent tests can be subjected to exactly the same conditions. As the sample soon becomes dry, all action of the bleaching agents may be disregarded. Having once determined what is a satisfactory period of exposure this can be repeated with new samples at any time.

A description of a satisfactory form of apparatus will be in place here. The lamp proper, which is covered by the

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Picramic Acid — Salicylic Acid
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hood, is a tube made of transparent quartz, made ¾ x 7 inches, with a well or depression at one end, containing mercury and a perfect vacuum being necessary to perfect operation. The leading in wires and anodes are tungsten, but otherwise the operation is similar to the ordinary glass mercury vapor lamps used by photographers and others. This lamp is on a 220-volt circuit, but when in operation registers about 170 V., 3½ A. There is a great increase in the number of short rays at this higher voltage and while the ordinary lamp used by physicians can be viewed by the naked eye, a lamp of this type will cause, in one second, an acute inflammation of the eyes lasting three days. Fifteen seconds exposure of the face, with the eyes protected by amber glasses, caused a reddening of the skin to develop several hours later, which was identical with sunburn.

The samples to be exposed are about 18 inches below the tube and must be protected by metal, as the rays penetrate slightly through cardboard. White wool is somewhat yellowed and the regular mixture for olive drab loses its mixed appearance during exposure as the white changes. From a number of tests it was computed that the exposure under the lamp shown had a value very close to eight times that of sunlight, or roughly one hour under the lamp equalled an average day's exposure. However, in such tests as have been ordered by Government departments, the orders have been for 48 hours' exposure, which will fade the majority of dyestuffs.

If the ultra violet exposure is to be made an official test, it will be necessary to standardize it more closely. All lamps differ in power according to the voltage supplied and to the automatic resistance in their control. As the lamps age, the devitrification of the quartz, the deposit of tungsten oxides, and the loss of vacuum by leakage, cause a lessening of the radiation. These features are being studied now at several laboratories and the results will have much to do with making this an official test. As there is a great difference in the power of different lamps at the outset, and as all lose some of their intensity by constant use, it can be easily seen how much variation is possible in comparing the work of several observers. As soon as we are able to measure ultra violet radiation it will be possible to compare results made under different conditions at different times. Attempts to use photographic printing paper are of little use, because there are many rays that are visible and pass through glass which affect it as well as the ultra violet rays, and moreover the action is very rapid and prevents an accurate measurement. The most promising methods are those which depend on the liberation of a gas from a liquid contained in a quartz tube when exposed to the rays, but such methods have not yet been worked out for practical use.

Stock and Piece Dyeing

Naturally, when one sees so much of one color as we now do of olive drab there is also a tendency to reproduce it in all classes of goods. On one hand, there are the knitting yarns made from all grades of stock, from worsted down to the lowest grades of shoddy and noils, intended for ultimate use by the soldiers, and on the other hand the finer cloths for ladies' dress goods and various accessories brought into being by the military tendency of the fashions. A sharp distinction must be made between the shades that are the result of stock dyeing and mixing, and those which are yarn or piece dyed in solid shades. For stock dyeing we require fastness to scouring and often to fulling against white and fastness to light generally accompanies these qualities. For yarn and pieces the chief requirements are level dyeing, penetration, and, if possible, fastness to light. Fastness to light in easy leveling piece dyes is now out of the question with acid colors.

We can obtain Tartrazine and the American equivalent of Sorbine Red, but in place of the Alizarine Sapphirols we must use Acid Blacks or Indigotine. While Patent Blue and Fast Acid Violet 10B are now made, the supply and price puts them beyond the reach of this class of work. The dye-baths are worked with sulphuric acid and Glauber salt, the predominant color is the yellow, with a lesser quantity of red and only enough blue to darken the shade. It is not possible to give exact recipes at this time on account of the great variation in

shade and strength of the dyes now being offered, but, with the experience acquired in the past few years, any dyer will be able to get the desired shade with the colors noted above. To get the necessary fastness to light is not possible with acid dyes, but we must use chrome colors.

Regarding Shades

The dyer aims to get two shades, a full golden brown with a lively yellow overtone and an olive green with a yellow overtone. The shades must not be flat but will require at least 2 per cent. of a strong Alizarine Yellow as a basis, with possibly ¼ per cent. of red and ⅛ per cent. of black for the brown, while for the olive green the red is halved and the black doubled. The dyebath is started cool and the heat gradually increased while the wool is well worked and when the boiling point is reached the boiling continues for an hour. The bath has had no additions but the dyes, but some prefer to add 10 per cent. of glauber salt, to favor evenness and penetration of the fiber. After an hour's boiling, 5 per cent. of acetic acid is added and the boiling continued ½ hour longer, then a final chroming with 2 per cent. of bichromate of soda follows in the same liquor. This develops the color to its full extent, but also strips the black and often produces a redder effect than was expected.

As some free chrome would be left on the stock, this is likely to turn green from its later reduction and so alter the shade it is usual to add a little formic acid to complete the reduction in the bath. It is likely that here also bisulphite of soda would be equally efficient. A thorough rinsing and drying follows. The whole process has consumed about 5 hours, counting time of loading the kettles.

The two shades are kept separate and are later mixed for spinning. A typical mixture consists of about 4 parts of brown, 3 parts of green, 2 parts of yellow and 1 part of white. A small sample mixing is made and carded, then a pad is scoured and rubbed by hand in soap until well felted, then rinsed and dried. The pad may be compared with the sample of cloth to be matched and any tests applied before going into the actual manufacture of a large lot. It is only by these precautions that success can be hoped for because one may have the proper dyes and process and yet find the sample pad to fail, and instances have been known of the regular work of the mill to suddenly show defects through a slight oversight in one of the earlier stages.

Cotton to be used in such fabrics as permit of the admixture of cotton must be dyed with sulphur colors. The va-

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riety of sulphur dyes now obtainable is not very great, but most of the shades used are only combinations of yellows, preferably of reddish shade, and black. The color inclines more toward the olive green but as long as the cotton is well covered almost any tone will answer and allowance can be made in the mixing. The sulphur dyebath is generally a standing kettle and for each lot dyed sodium sulphide and soda ash is added. After an hour's boiling it is best to throw the stock on a drain board and permit of an oxidation for an hour or two before rinsing. Rinse thoroughly several times as there is a danger of fires in the dryer if any sulphur compounds remain in the stock, particularly with low grades of cotton.

Abstract from analysis written by Dr. E. W. Pierce for the Textile World Journal

GET TOGETHER

Duty to the commercial prosperity of America demands that
You conduct this business with a view to
Establishing this industry on a permanent footing.
Standardizing of your products is of vital importance
To the success of your individual efforts, but
Until there is a spirit of cooperation evident, the
Fruits of your toil will yield nothing toward
Fortifying the industry against the invasion that threatens.

Antagonistic feeling among individual manufacturers increases the
Secretiveness that retards the progress of the industry.
So let us meet together as real Americans and
Overcome the possibility of over-production by
Cooperation of manufacturers and sales representatives and
Inject into the industry that spirit of good-will which
Alone can dispel the effect of selfishness and
Turn our attention to "thoughts of the 'morrow" so
In that moment when competition does come, we can
Oppose against its progress a bulwark of consumer faith that
N propaganda can threaten and no methods change.

On your individual actions rests the possible
Future of the industry—a permanent success for America, or

A camouflage of plant erection for consumer misleading.
Might we not expect more Governmental cooperation if
Each manufacturer informed those in authority, as
Readily as he in the past informed the consumer, regarding
Interesting developments in his ***own plant*** and then
Could the manufacturers ask—even demand—that
American commerce be protected from Teutonic invasion.

—*M. D. R.*

National Aniline & Chemical Co., Inc.
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